GIS FOR THE NATION

Proposed Data Sharing Information Model for Local, State, Regional, Tribal, and National GIS

DATA THEMES AND STRATEGIES

SCALES OF USE

NATIONAL/STATE | REGIONAL/COUNTY | CITY | NEIGHBORHOOD

DATA THEME PROPERTIES

Emergency Operations

Operations features should be collected at the appropriate scale for each specific activity or incident. GPS field collection or interpretation from imagery preferred for data capture. Grid map location descriptions are also useful.

Feature types	Incidents, damage, operations, and safety locations—road closures, evacuation routes, shelters, contamination zones, fire boundaries
Map use	Emergency response, homeland security, and national preparedness
Data	Local, state, and federal agencies
Representation	Points, lines, polygons, annotation
Spatial relationships	Operations must often be vertically integrated with structures, roads, administrative boundaries, and other geographic features.
Information needs	Incident name, organization, address, points of contact, start and end dates

Structures/Critical Infrastructure

Building footprints, entrances, complexes, driveways, etc. High accuracy required for neighborhood- and city-level maps. Should be captured and represented to fit on the orthoimagery base.

Feature types	Structure locations, building footprints. Point locations for building centroids, entrances, driveway entrances. Building complexes, wells. Often includes 3D representations of structures.
Map use	Tax assessment, planning, emergency response, critical infrastructure protection
Data source	Federal, state, and local governments; HAZUS
Representation	Points, lines, polygons, annotation
Spatial relationships	Often, structure location points must be located along or within the buildings they represent.
Information needs	Address, name, points of contact, HAZUS attributes, associated address, and structure names. For critical infrastructure, emergency contact information, level of risk, facility details.

Government Units

High accuracy required. Units can span across a range of map scales from 1:10,000 or 1:25,000 in cities and up to 1:250,000 in regions and states. Must be vertically integrated with the base features from which they are derived, along with other government units.

Feature types	Administrative areas, census units, and management jurisdictions for local governments, states, federal agencies, and Native American organizations
Map use	Administrative and legal boundaries
Data source	Federal, state, and local governments; U.S. Census
Representation	Polygons
Spatial relationships	Unit boundaries often must be vertically integrated and follow along boundaries of features such as roads, parcels, rivers. Areas must not self-overlap.
Information needs	Managing agency, name, FIPS code, uses, demographic characteristics

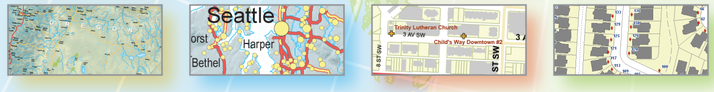
Utilities

Accurate relative to cadastral and transportation data. Typical data capture scales are from 1:2,500 to 1:6,000. Accurate, shared local/state land base required for integration with other GIS datasets.

Feature types	Key components of water, wastewater, electrical, telecommunications, and pipeline networks
Map use	Transmission and distribution maps, emergency response, critical infrastructure protection
Data source	Local utilities
Representation	Lines, points, areas, annotation
Spatial relationships	Integrates within the parcel and land base (building footprints, curb lines, and other structures)
Information needs	Equipment type, size, date installed, ownership, connectivity

Addresses and Names

Address and name information will be associated with features collected at neighborhood extents for building entrances, structures, parcels, and landmarks. Addresses and names will also be collected for other addressable features, such as street centerlines and place-name locations.



Feature types	Address ranges along street centerlines (DIME style), as well as address point locations for building entrances. Also, place-names for key landmarks, geographic zones, and locations.
Map use	Geocoding, route planning
Data source	Local, state, and federal governments; commercial sources
Representation	Points, lines, polygons, annotation
Spatial relationships	Address points must fall within buildings and parcels.
Information needs	Address, address styles, alternative addresses, address relationship to each feature representation (to parcels, building centroids, building entrances, points of interest, and streets)

Transportation

Centerlines for addressing and navigation purposes; larger scale representations provide more detailed infrastructure and network characteristics. Roads should follow a simple centerline with address range approach at local and state levels.

Feature types	At neighborhood level: curb, street center, rail, commuter, bus, and other lines; stations as polygons. At city level and above, street centerlines and transportation lines, stations as points.
Map use	Basemaps, transportation planning and analysis, emergency route planning
Data source	City and county governments, state DOTs, commercial sources
Representation	Lines, junctions, polygons, annotation
Spatial relationships	Road segments must connect.
Information needs	Street names, address ranges, road class, roadway characteristics, optional navigation and linear referencing characteristics, jurisdiction for law enforcement and emergency response

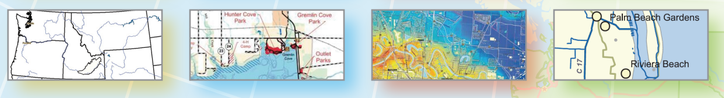
Cadastral

Primarily collected at neighborhood scales using survey techniques. At the neighborhood level, the parcel is the primary mapping unit. City- and county-level representations are important to identify and distinguish city blocks and to highlight government and private lands.

Feature types	Tax parcels, ownership parcels, and parcel corners. Also includes key features that integrate into the land fabric, such as zoning, rights, interests, and easements.
Map use	Tax mapping, surface ownership maps, PLSS reference maps
Data source	Local, state, tribal, and federal governments; BLM
Representation	Points, lines, polygons, annotation
Spatial relationships	Parcels and corners integrate with survey and legal description fabrics; many other data themes are referenced to the cadastre.
Information needs	PIN, owner, assessed value, improvements, rights, interests, encumbrances, survey characteristics

Hydrography

Regional, state, and national analysis from 100K resolution to 25K resolution. Local needs dictate better than 25K resolution, especially in flood-prone or coastal areas. Hydrologic network and channel representations are important to support analytical use.



Feature types	Hydro points, lines, polygons. Watersheds, coastlines, drainage areas. Connectivity and channel profiles for hydrologic analysis. Integrates with high-resolution (5M) DEM.
Map use	Surface water and features for moving, storing, and managing water. Basemapping. Includes support for hydrologic analysis.
Data source	Local and state water management agencies. Local and state governments. Federal agencies, including USGS, FEMA, NOAA, EPA.
Representation	Lines, points, polygons, annotation
Spatial relationships	Spatially integrated into landscape and terrain. Stream and water system connectivity is critical. Stream gauge stations should snap onto the hydro network.
Information needs	Identification, names, hydrologic properties, relationship to landscape features

Environmental

Three primary information sets: (1) physiographic and landform features, (2) environmental events and hazards, and (3) weather. Collected at city levels or 1:25,000 map scales. Vertical integration of landform polygons is important to ensure consistency in environmental classification and modeling.

Feature types	Includes physical features and landform characteristics, such as geology, hazards, and events (such as earthquakes, sites, facilities, environmental monitoring sensors, and measurements)
Map use	Soil maps, geology maps, environmental monitoring, permitting, spatial modeling, analysis
Data source	Federal agencies, such as USDA-NRCS, EPA, USGS, DEP; state and local governments
Representation	Polygons, points, annotation
Spatial relationships	Landform layers should be vertically integrated, and attribute combinations should be consistent.
Information needs	Environmental landscape classification, hazard areas. Need time series information for weather, stream gauges, and other sensors.

Land Use/Land Cover

Collected at city levels as attributes on parcels and administrative land units using the APA Landbase Classification System. Collected as raster data at scales of 1:50,000 or smaller using the Anderson classification system, this classification should integrate with environmental layers.

Feature types	Area units that define the primary ways in which land is used (e.g., urban, rural, agricultural, range, forest)
Map use	Land-cover maps, planning, zoning
Data source	Derived from remotely sensed data or captured at the parcel level
Representation	Polygons, raster datasets
Spatial relationships	Land use and land cover are integrated with other key layers depending on the geographic level. See collection guidelines.
Information needs	Land-use classification of parcels for local and regional planning. Also, classification of raster imagery for smaller scale analysis, such as natural resource management in a state.

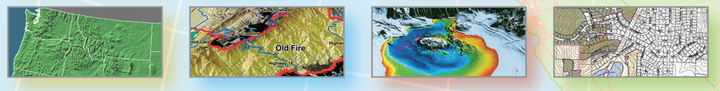
Basemap

Includes scanned maps and cartographic elements. Nationwide basemap products include scales of 1:25,000, 1:100,000, 1:250,000, and 1:1,750,000. Cities and other special areas: 1:5,000 and up larger engineering scales.

Feature types	Currently includes the use of existing map sheets as scanned background maps. New cartographic specifications should be developed for map series at a range of targeted map scales.
Map use	Digital Raster Map Graphics, scanned NOAA charts. Consistent presentation of national maps, as well as for each state and for cities.
Data source	All other data themes should be collected to meet these cartographic needs along with other application needs.
Representation	Points, lines, polygons, annotation, rasters, cartographic representations
Spatial relationships	Overlaps and other cartographic conflicts should be minimized in map representations.
Information needs	Text labels, place names, feature representations, cartographic elements, feature classifications, consistent symbology, map guidelines, map series designs and specifications

Elevation

Resolution to support five-meter DEM products that can be used for two-foot contours nationwide. In low-lying, flat areas, such as along coastal areas of the southeastern United States, finer resolution DEMs supporting up to one-foot contours should be collected and maintained.



Feature types	Includes surface elevation and bathymetric observations (such as lidar point collections, hydrographic surveys, and other 3D surveys) as well as derived DEMs
Map use	Viewshed analysis, surface distance calculation, resource flows. Environmental and water resources planning and analyses. General purpose mapping.
Data source	Lidar, sonar, surveys, other remotely sensed data
Representation	Elevation points, contour lines, TINs, DEMs, hillshades
Spatial relationships	Elevation is related to hydrography and orthophotography datasets.
Information needs	Elevation at a given location, navigational bathymetry, slope, aspect, historical changes in elevation/bathymetry

Imagery

Orthoimagery should be collected for populated areas at six-inch to one-foot resolution every two years using the same control as the cadastral data. Statewide coverage should be collected at one-meter or better resolution every three to five years.

Feature types	Focus is on high-resolution digital orthophotography coverage collected at periodic time intervals. Also includes government products, such as scanned maps and satellite imagery.
Map use	Aerial photography and satellite imagery as reference data
Data source	Various remote sensors
Representation	Raster
Spatial relationships	Many other datasets should align with or be derived from imagery.
Information needs	Color; elevation; georeferencing models, including stereo, cloud cover/time and other metadata

Geodetic Control

Geodetic control provides the basic reference for other data according to NGS specifications for identification and capture.

Feature types	Survey control network for local, regional, and national georeferencing. For neighborhood- and city-level geographies, control can be represented by the cadastral framework.
Map use	Common coordinate reference for all other geographic features
Data source	National Geodetic Survey and partners
Representation	Points, annotation
Spatial relationships	Cadastral, orthoimagery, and lidar data should be tied to geodetic control. GPS ground station and transportation networks may also be referenced to geodetic control.
Information needs	Identification; monuments; survey locations; survey order; metadata for coordinate systems, including vertical and horizontal datums